# Soil Nitrogen Cycling in Mixed Forests of Varying Soil Texture on Fort Benning, Georgia

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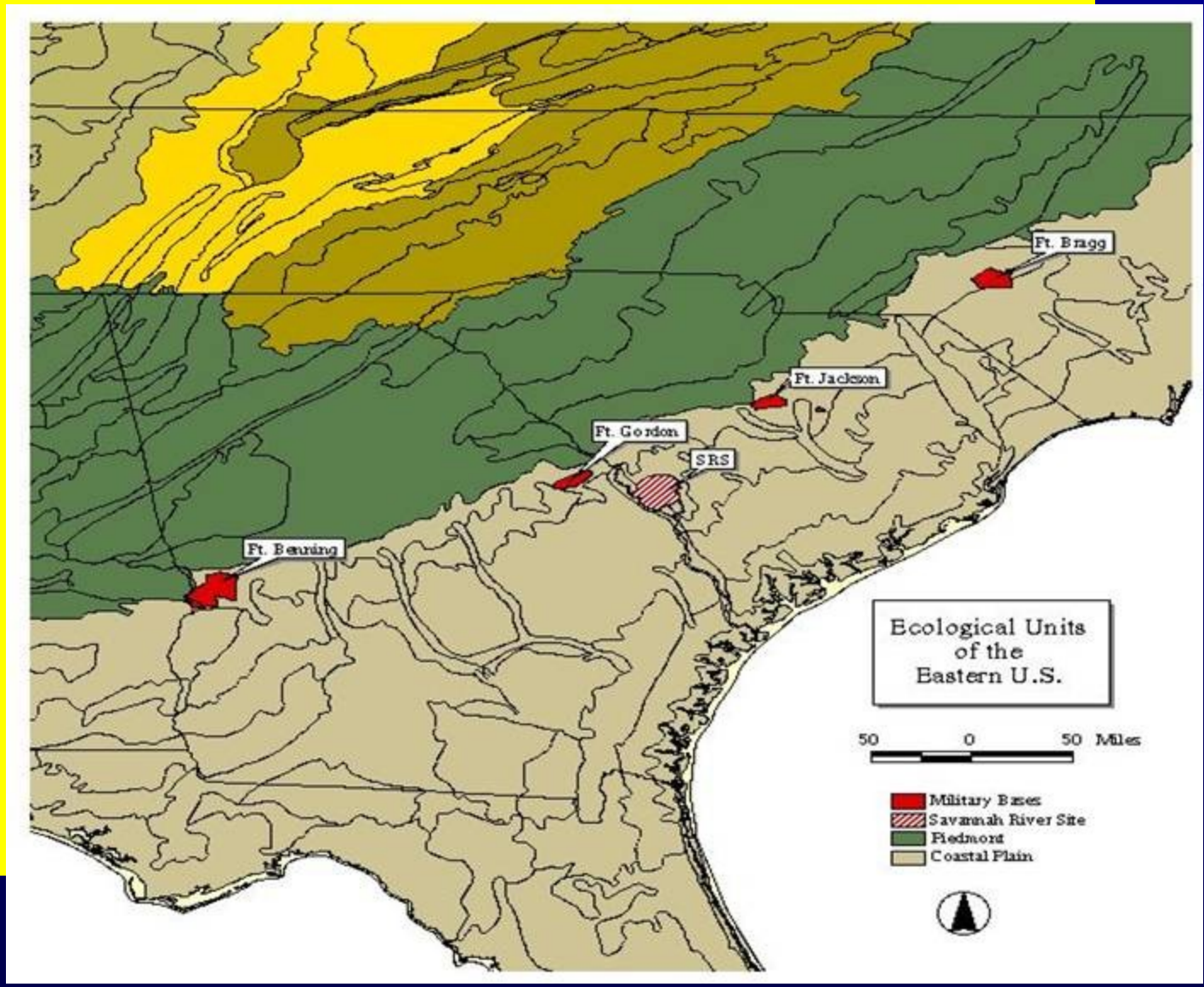
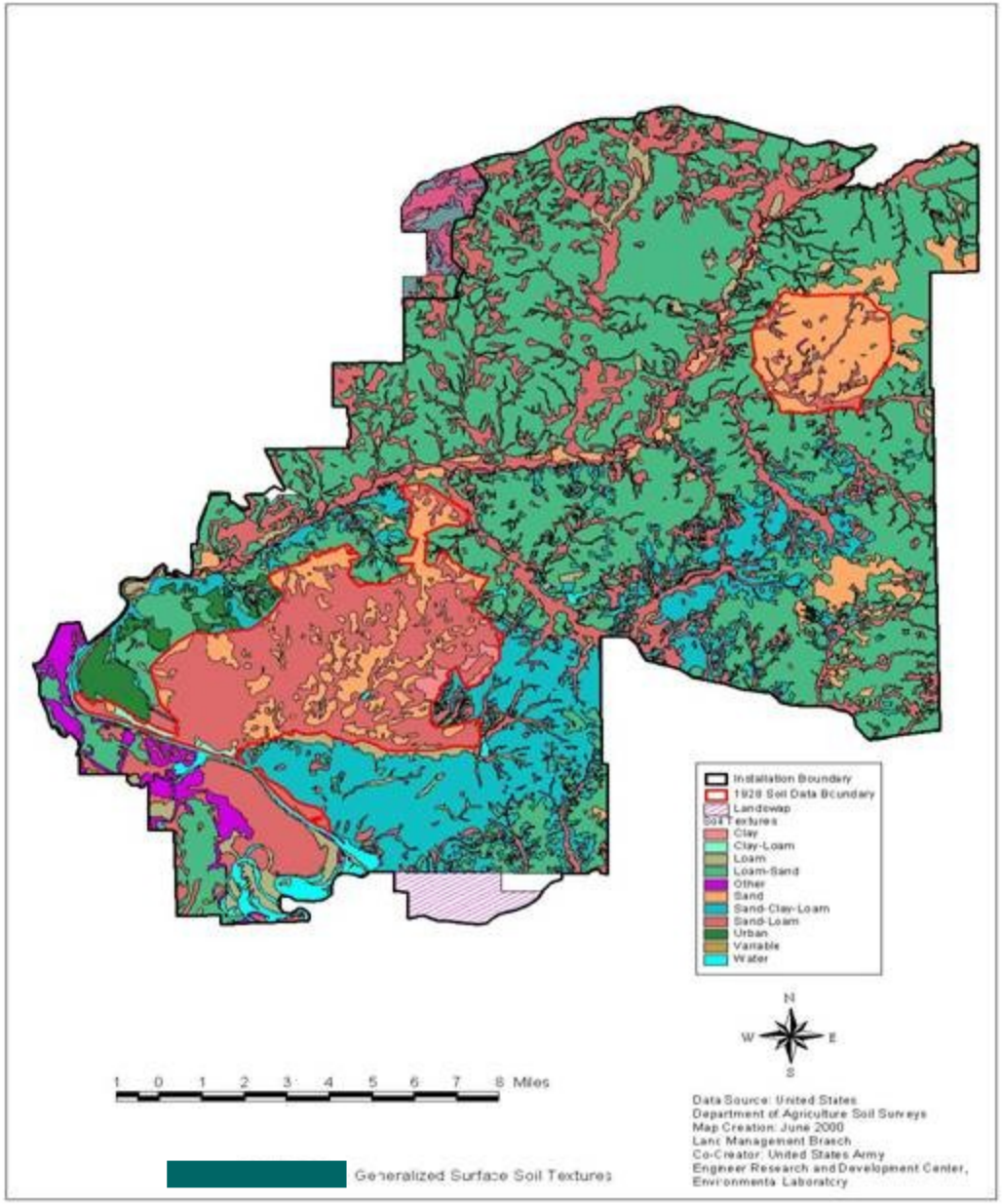
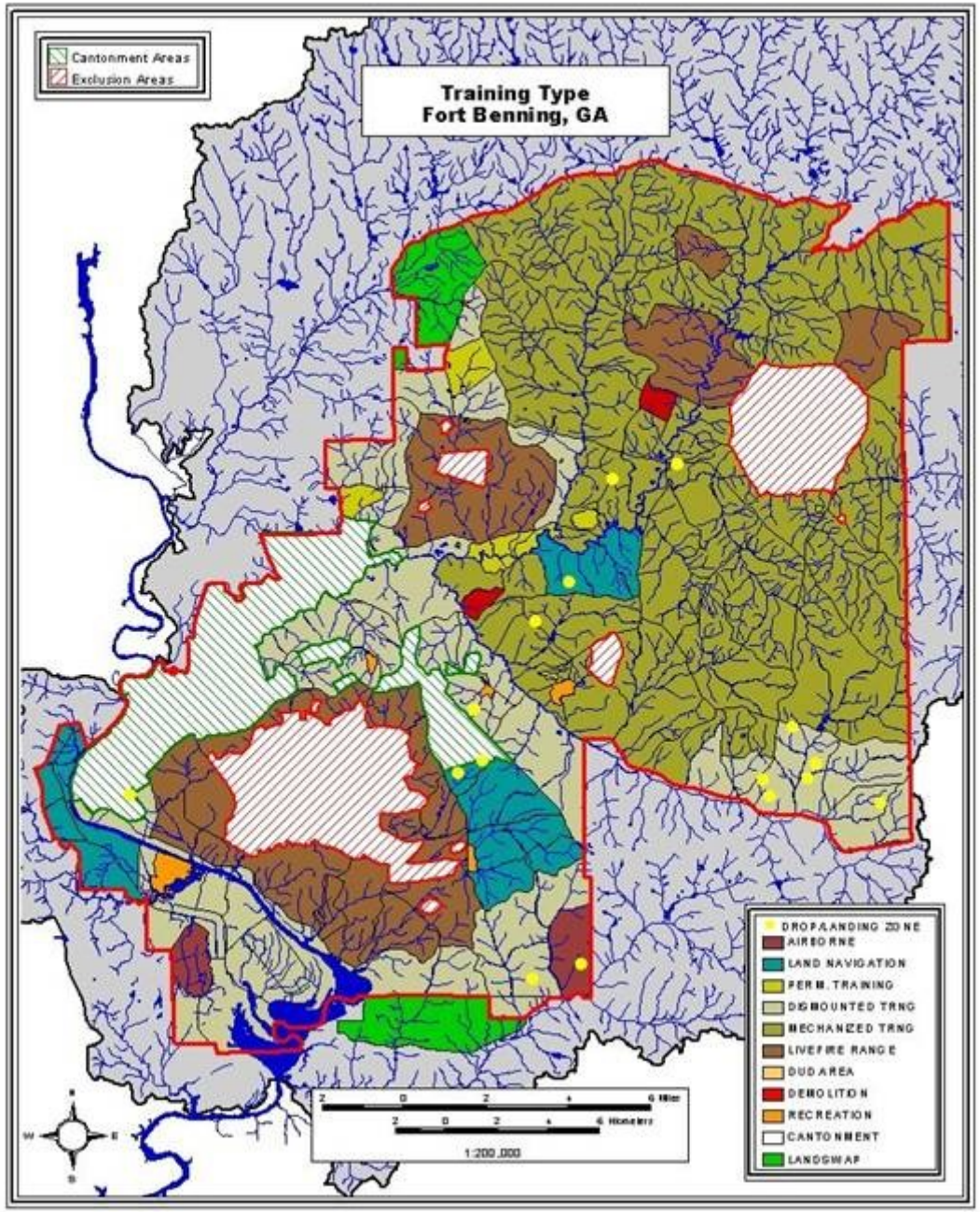

Ft. Bragg
Ft. Jackson
Ft. Gordon
SRS
Ft. Benning
Ecological Units of the Eastern U.S.
50 0 50 Miles
Military Bases
Savannah River Site
Piedmont
Coastal Plain


Installation Boundary
1928 Soil Data Boundary
Landswap
Soil Textures
Clay
Clay-Loam
Loam
Loam-Sand
Other
Sand
Sand-Clay-Loam
Sand-Loam
Urban
Variable
Water
N
W
E
S
1 0 1 2 3 4 5 6 7 8 Miles
Generalized Surface Soil Textures
Data Source: United States Department of Agriculture Soil Surveys
Map Creation: June 2000
Land Management Branch
Co-Creator: United States Army Engineer Research and Development Center, Environmental Laboratory

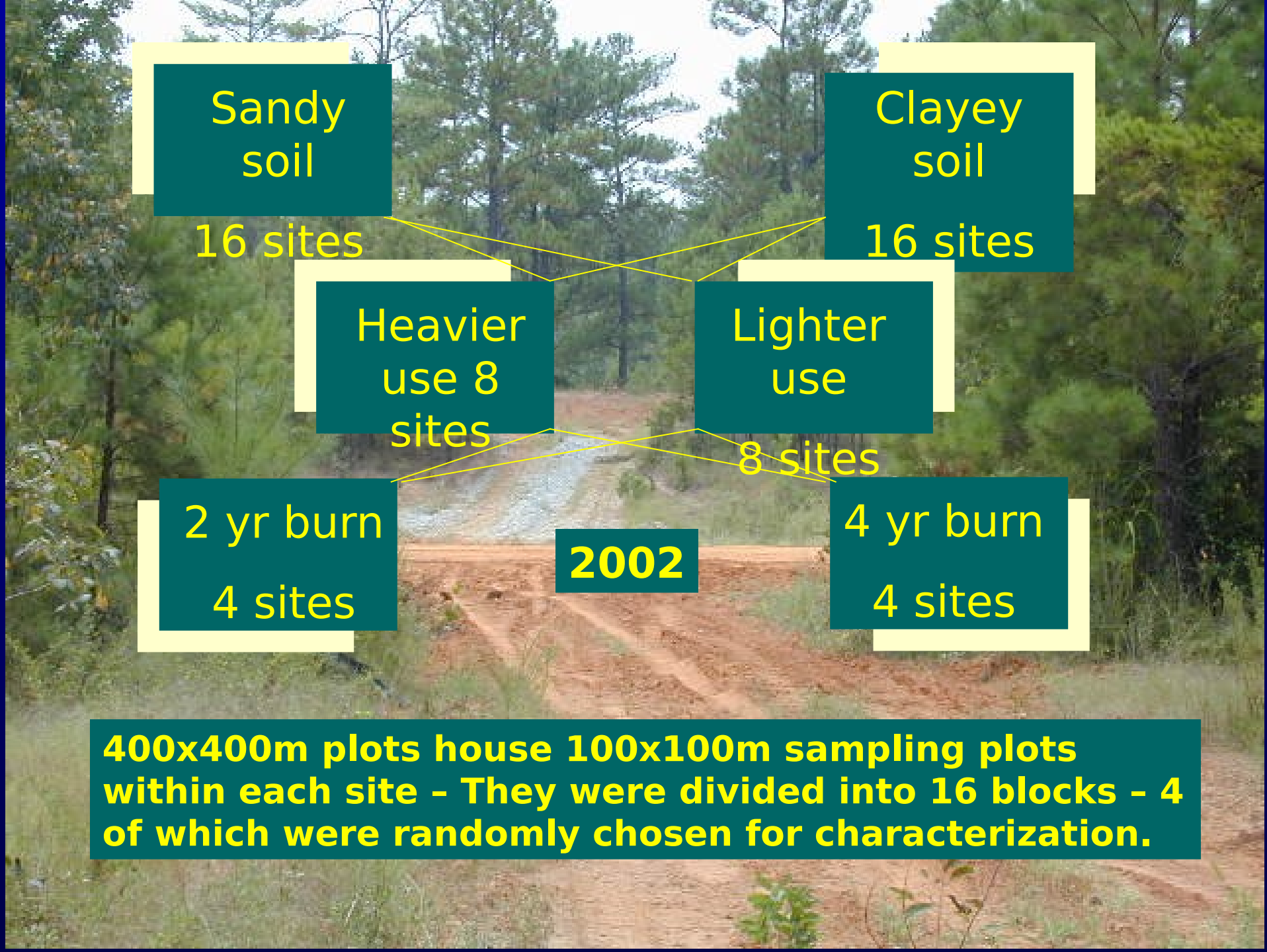

Cantonment Areas
Exclusion Areas
Training Type
Fort Benning, GA
DROP/LANDING ZONE
AIRBORNE
LAND NAVIGATION
PERM. TRAINING
DISMOUNTED TRNG
MECHANIZED TRNG
LIVEFIRE RANGE
DUD AREA
DEMOLITION
RECREATION
CANTONMENT
LANDSWAP
1:200,000

# Background

***Mixed pine forests of Ft Benning GA have been managed for approximately twenty years using prescribed burns with roughly three year intervals. We have 32 study sites that were burned in 2000.***

# Objective

***To identify patterns of nitrogen availability in mixed pine forests of varying soil texture and land use intensity at Ft Benning, Georgia.***


Sandy soil
16 sites
Clayey soil
16 sites
Heavier use 8 sites
Lighter use
8 sites
2 yr burn
4 sites
2002
4 yr burn
4 sites
400x400m plots house 100x100m sampling plots within each site – They were divided into 16 blocks – 4 of which were randomly chosen for characterization.

# Methods

- **Pooled organic layer $O_a$, $O_i$, $O_e$ – 32 sites**
  **- harvested (8 - 494 $cm^2$) and dried at 70$^oC$**
  **- analyzed for total nitrogen using a CHN analyzer**

# Methods

- **Pooled organic layer was harvested (8 - 494 $cm^{2)}$ in each site and dried at 70$^{o}$C –and analyzed for total nitrogen using a CHN analyzer.**
- **Mineral soil- 32 sites**

  **- Samples from each site (8 - 17 cm depth)**

  **- Extracted with 2M KCl, analyzed for $NH_4$ and $NO_3$ with an autoanalyzer. Incubated in the laboratory and extracted again at 42 and 84 day intervals.**

# Methods

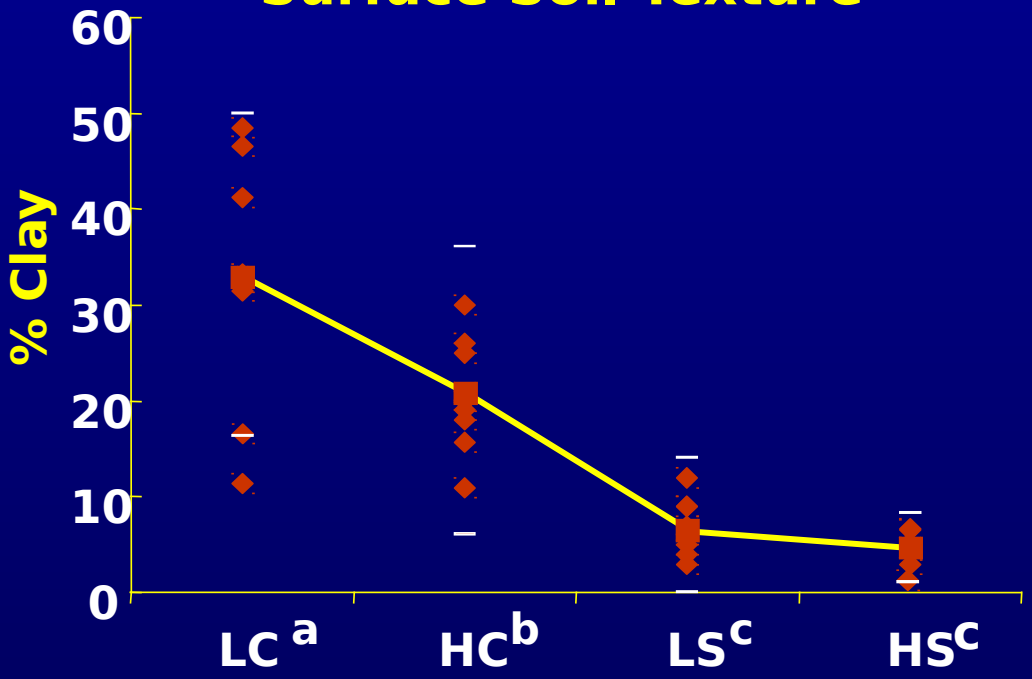
- **Pooled organic layer was harvested (8 - 494 $cm^{2)}$ in each site and dried at 70$^{o}$C - and analyzed for total nitrogen using a CHN analyzer .**

- **Mineral soil samples were collected in each site (8 - 17 cm depth). Samples were extracted with 2M KCL and analyzed for $NH_4$ and $NO_3$ with an autoanalyzer. Incubated in the laboratory and extracted again at 42 and 84 day intervals.**

- **Nitrogen leakage was measured using ceramic cup tension lysimeters installed to a depth of 60cm.**

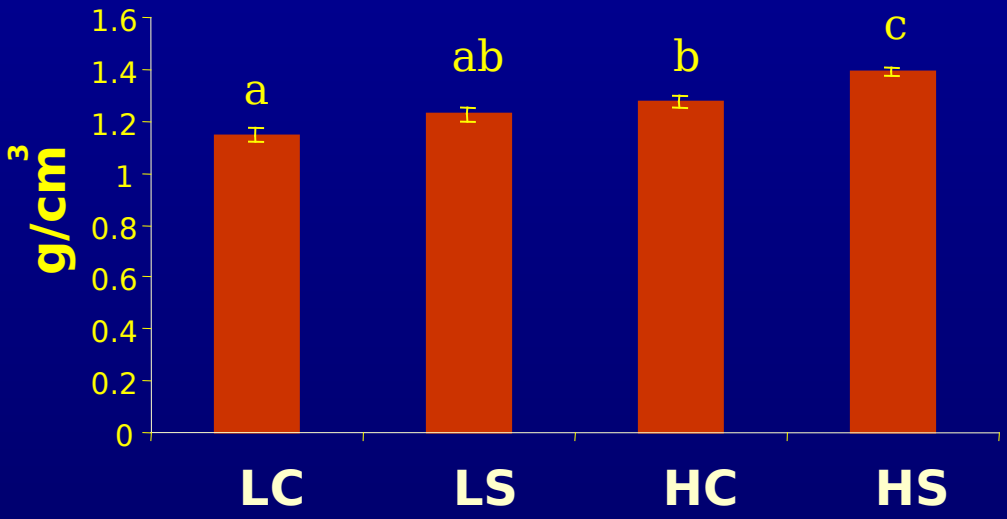
# Soil Characteristics

## Surface Soil Texture

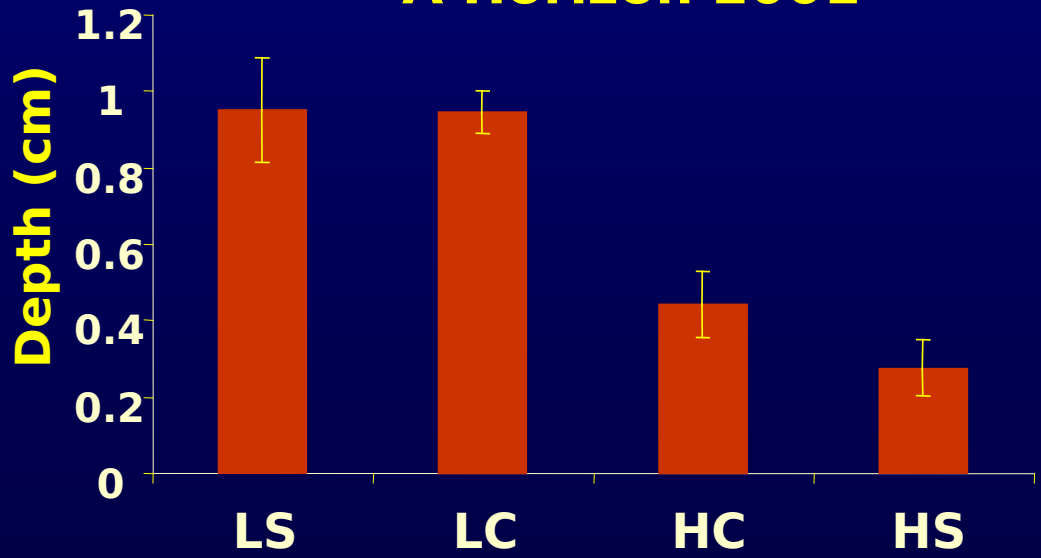



LC= Light Use/ Clay
HC= Heavy Use/ Clay
LS= Light Use/ Sand
HS= Heavy Use/ Sand

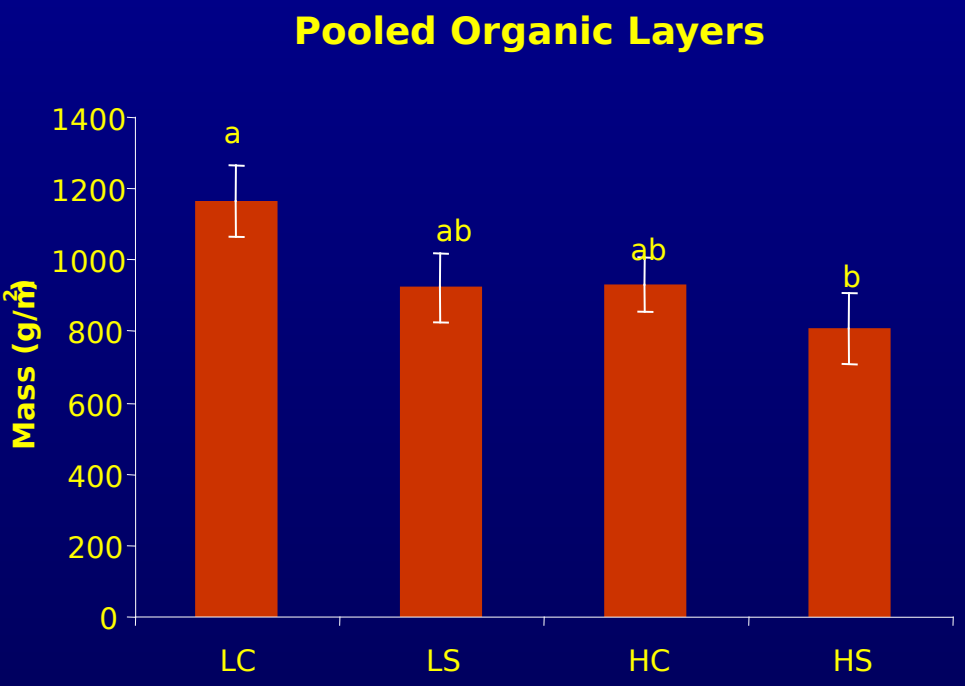
## Soil Bulk Density 2001

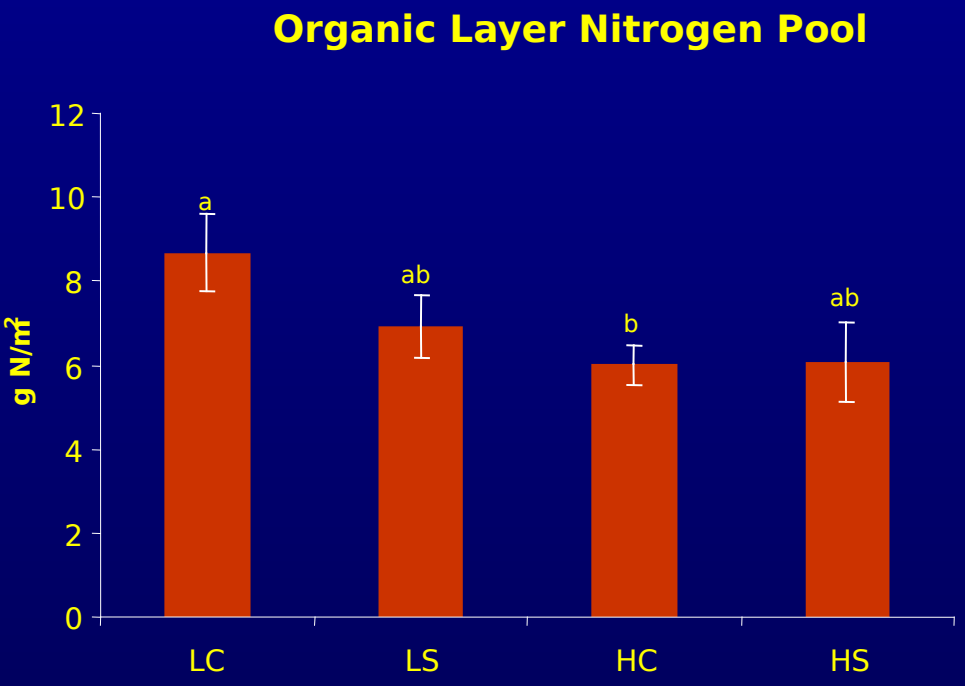



## A Horizon 2001

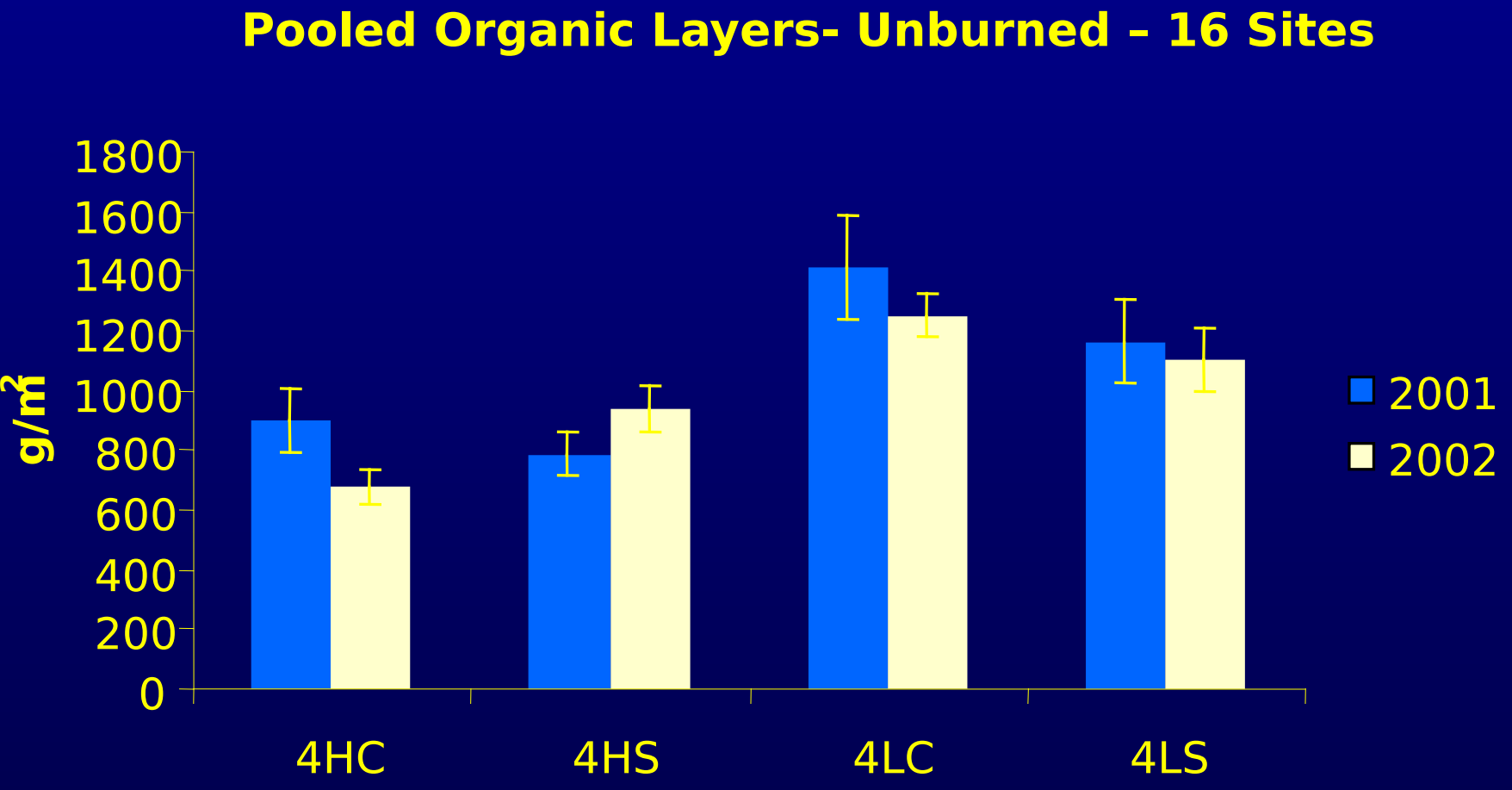


# Organic Layer 2001

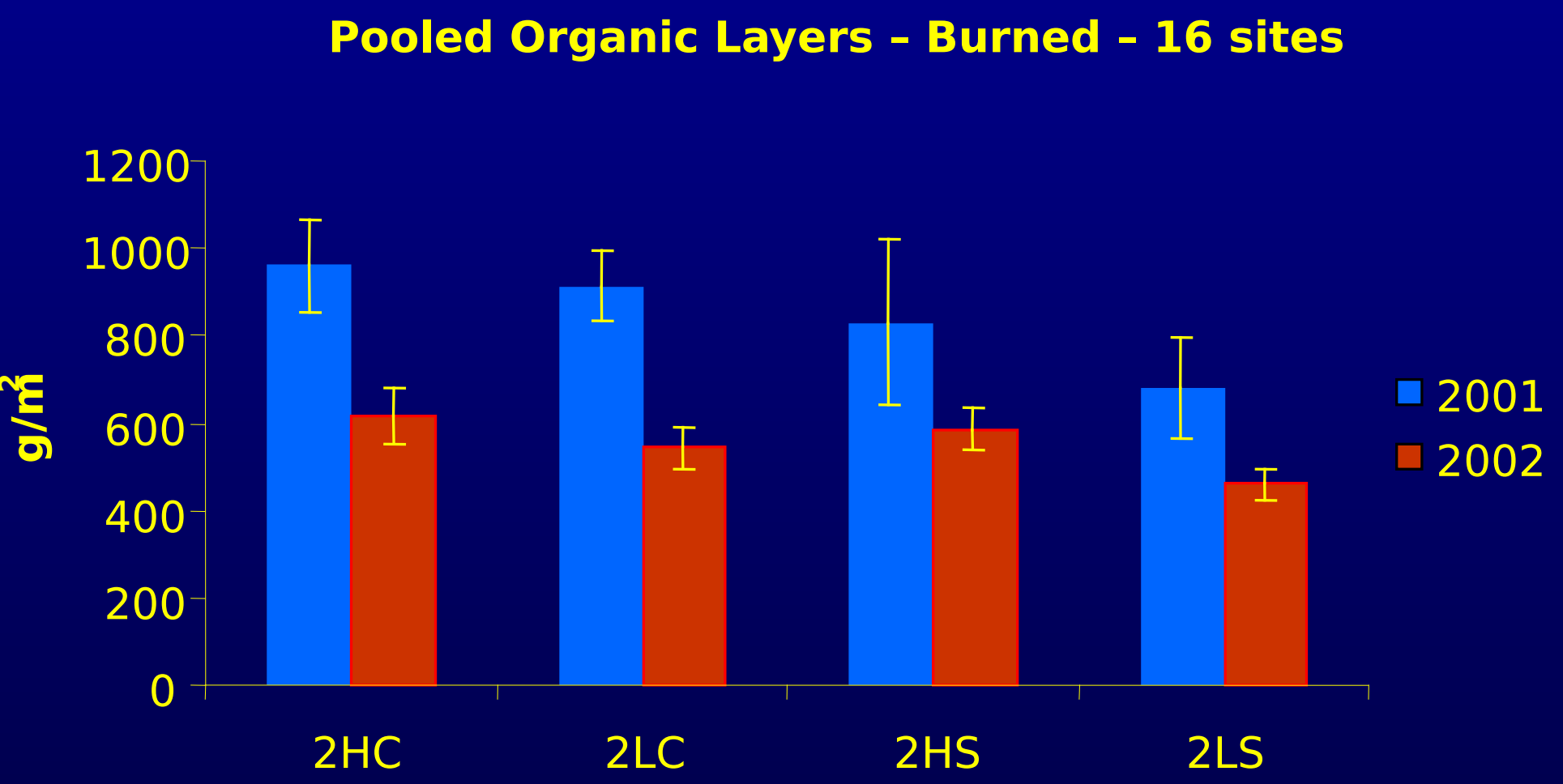


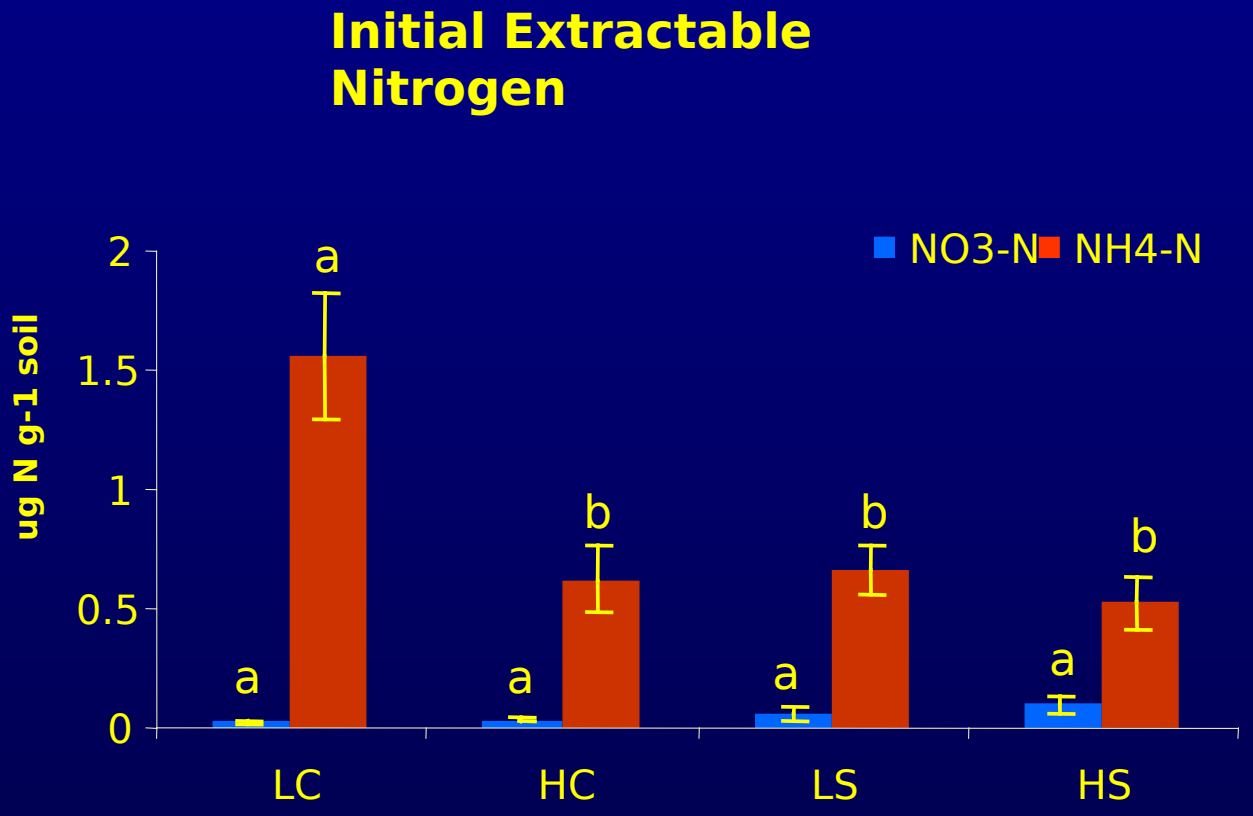
# Organic Layer Accumulation



# Organic Layer Burn Response

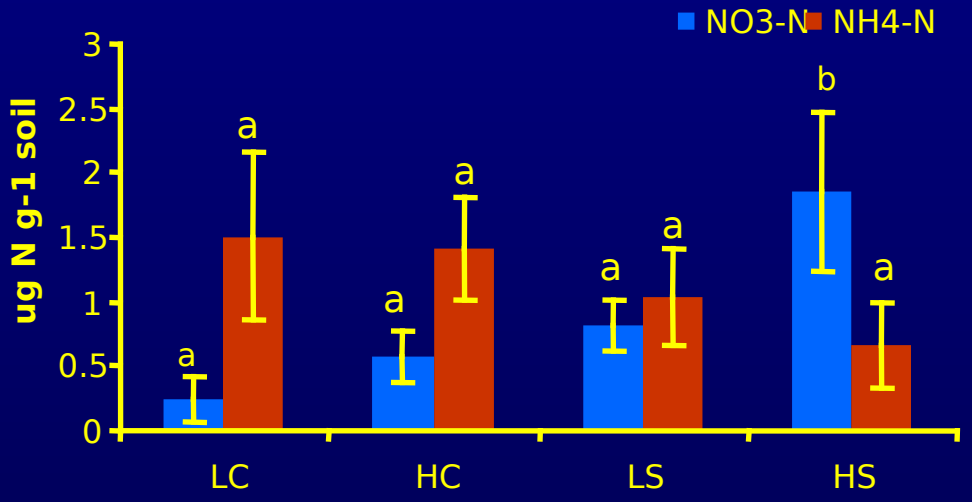


# Nitrogen Mineralization-2001

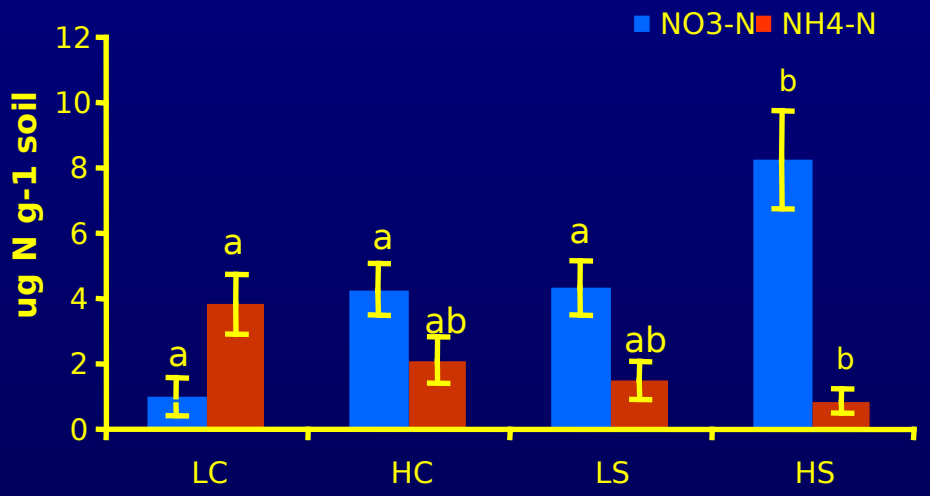


# Nitrogen Mineralization-2001

**Aerobic 42-day incubation**



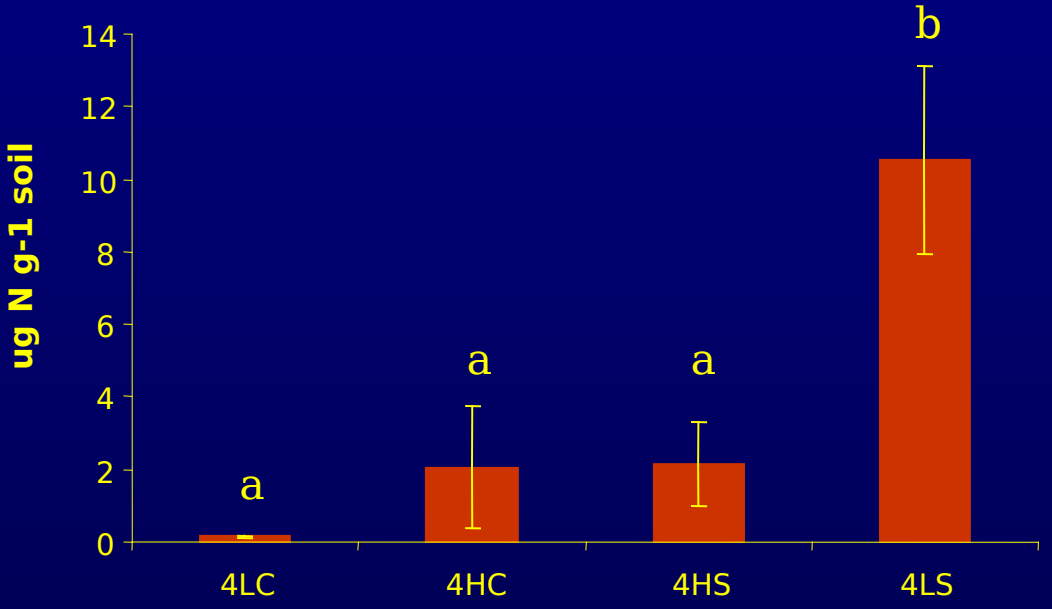

**Aerobic 84-day incubation**



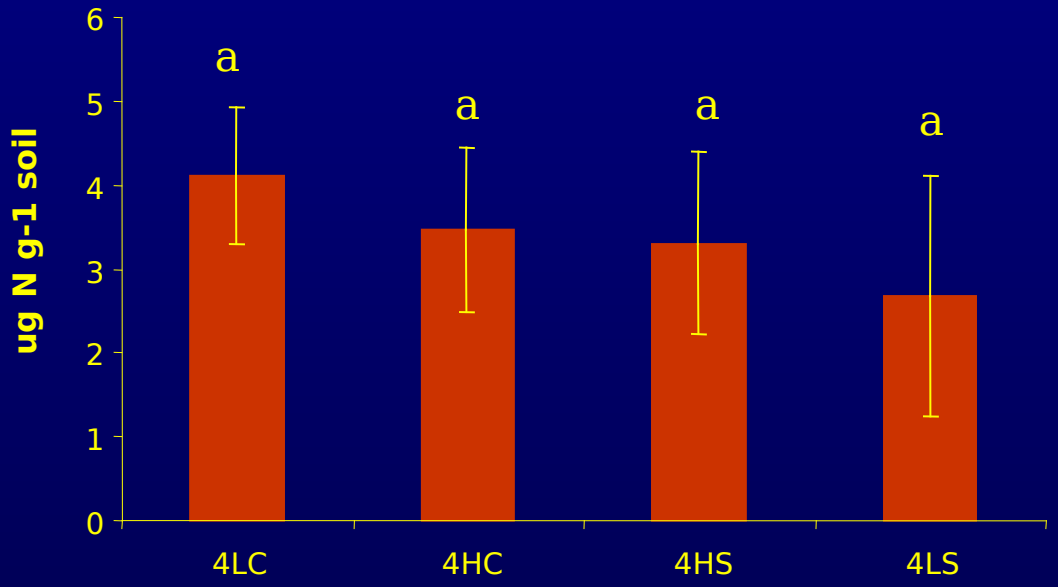
# Nitrogen Mineralization-2002

**Aerobic 84-day incubation- 16 unburned plots**

$NO_3$-N

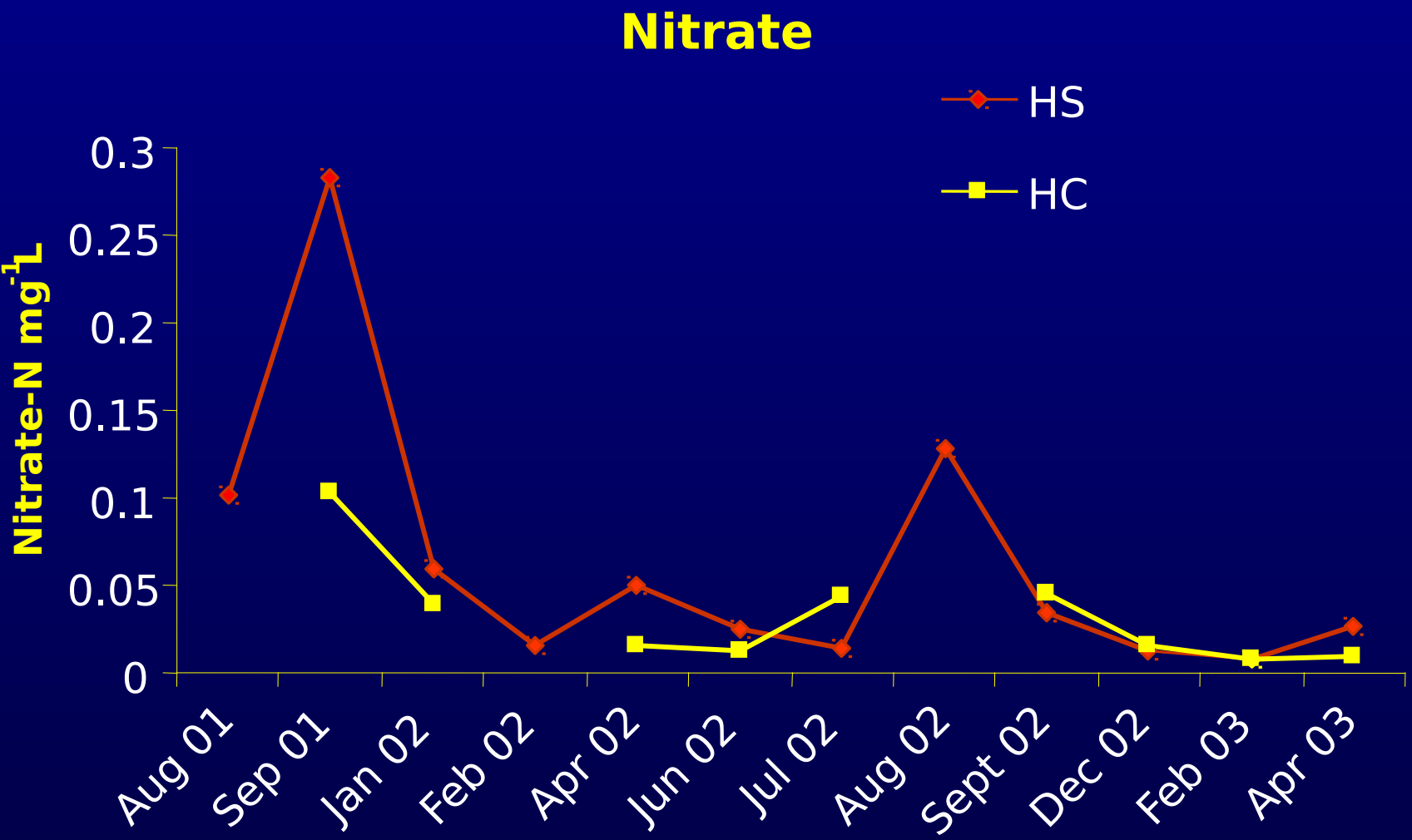



$NH_4$-N



# Nutrient Leakage

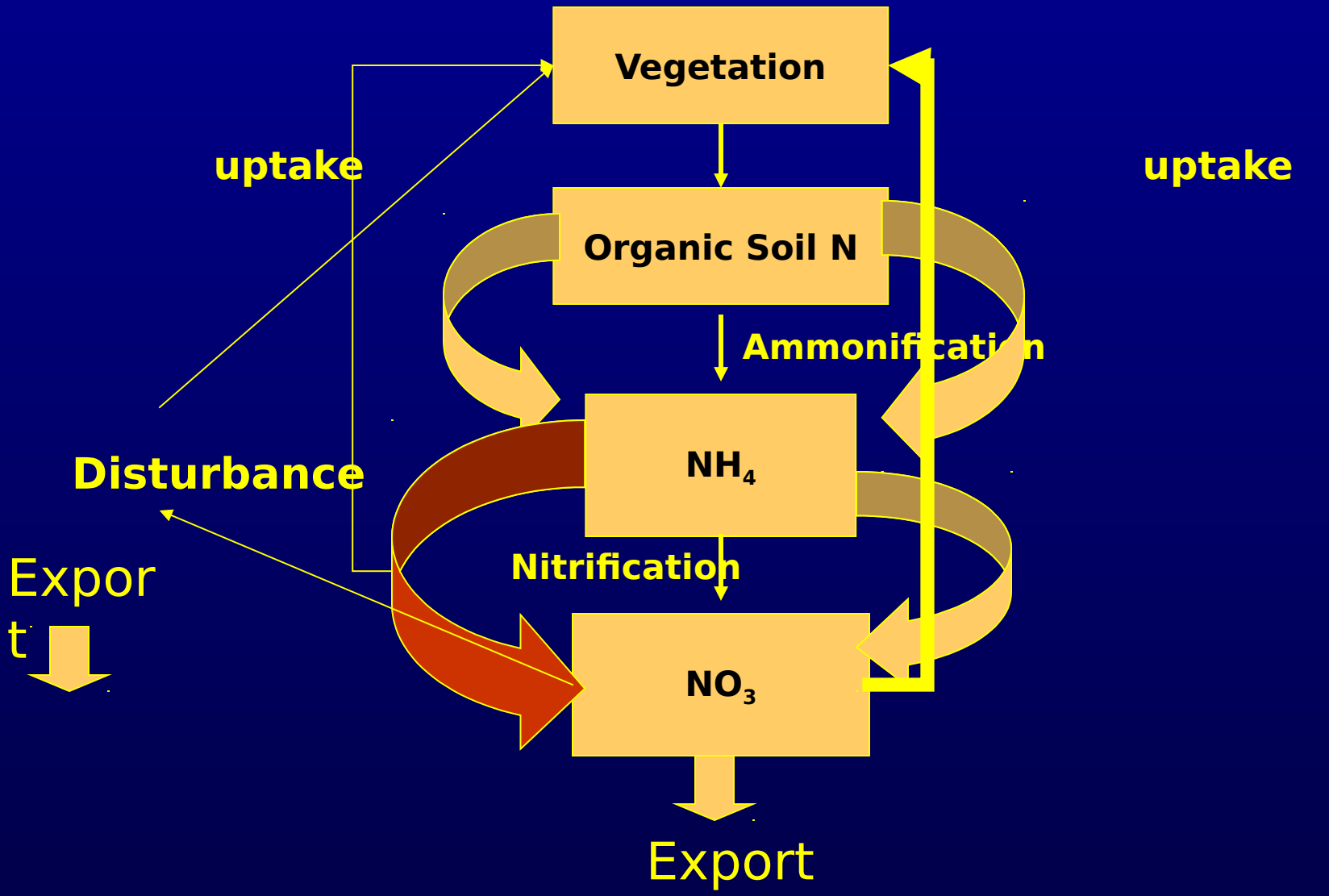
or “When you aint got nothing – you got nothing to lose”



# Soil Mineralization

Sandy Soil

Clayey Soil



# Acknowledgements

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SEMP
SERDP Ecosystem Management Project

DoD EPA DOE SERDP
Strategic Environmental Research and Development Program
Improving Mission Readiness Through Environmental Research

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